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INNOVATIVE S`TRATEGIES FOR ENHANCING SUSTAINABILITY AND CORPORATE SOCIAL RESPONSIBILITY IN E-COMMERCE: A DATA-DRIVEN APPROACH (WITH REFERENCE TO CHENNAI CITY)

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ABSTRACT

The study aims to contribute to both academic literature and practical business strategies by identifying and analyzing innovative, data-backed CSR and sustainability practices in the e-commerce sector. The acumens will benefit policymakers, environmental advocates, tech developers, and e-commerce firms aiming balanced growth with social responsibility and environmental stewardship. Data were collected from a sample of 580 respondents through personal interview, using simple random sampling method. Statistical modeling using Structural Equation Modeling (SEM), regression analysis, and data-driven insights from consumer surveys and environmental impact assessments, chi-square test, one way ANOVA, SEM analysis, sentiment analysis method used to determine the relationship between demographic characteristics and sustainable development and CSR. It provides a foundational understanding of the need for data-driven sustainability and CSR in e-commerce, particularly in the context of Chennai city. This research will bridge the gap between sustainability theory and industry practice, providing insightful strategies for a greener, more responsible e-commerce sector.

(Key words: Corporate Social Responsibility, Sustainable Practices, E-Commerce Sector, , Environmental Impact Assessments, Structural Equation Modeling,)

INTRODUCTION

E-Commerce has transformed global trade but raises concerns about sustainability and corporate social responsibility (CSR). The Expansion of E Commerce has raised serious concerns regarding sustainability and corporate social responsibility with critical issues related to carbon emissions, unethical labor practices, packaging waste, and data privacy. Companies

that proactively address environmental and social concerns often enjoy enhanced brand reputation, increased customer loyalty, and long-term profitability. The adoption of sustainability and CSR Strategies is no longer a corporate choice but a competitive necessity.

BACKGROUND OF THE STUDY

The e-commerce industry has experienced unprecedented growth over the past decade, transforming the way consumers interact with businesses and access goods and services. With increasing urbanization, smartphone penetration, and internet accessibility, cities like Chennai have emerged as vibrant hubs for online retail. However, this exponential growth has raised critical questions around environmental sustainability and corporate social responsibility (CSR). From packaging waste to carbon emissions in logistics, the sector's environmental impact is becoming a growing concern.

In this context, sustainability and CSR are no longer optional for e-commerce players; they are essential. Companies are now leveraging data-driven technologies such as Artificial Intelligence (AI), Machine Learning (ML), Internet of Things (IoT), and Blockchain to craft innovative solutions that promote responsible business practices. These include optimizing delivery routes to reduce fuel consumption, using eco-friendly packaging, ensuring ethical sourcing, and engaging in community development initiatives.

STATEMENT OF THE PROBLEM

Despite the global emphasis on sustainable development and CSR, many e-commerce businesses in Indian cities like Chennai are still in the early stages of integrating these principles into their operations. There exists a gap in the adoption and awareness of innovative, data-driven sustainability strategies. This research seeks to address the following problem: How can data-driven innovations enhance sustainability and CSR in the e-commerce industry within the Chennai city context?. E-Commerce companies face reputational risks and market share loss without integrating sustainability and CSR. Need for data-driven strategies to enhance Sustainability and ethical governance.

OBJECTIVES OF THE RESEARCH STUDY

- To analyze current sustainability and CSR trends in E-Commerce globally.
- To evaluate the environmental impact of logistics, warehousing, and packaging.
- To investigate consumer perceptions and preferences regarding sustainable practices.
- To assess the role of emerging technologies (AI, blockchain, green logistics) in promoting sustainability.
- To develop strategic recommendations for integrating CSR and sustainability frameworks.

SIGNIFICANCE OF THE STUDY

The study aims to contribute to both academic literature and practical business strategies by identifying and analyzing innovative, data-backed CSR and sustainability practices in the e-commerce sector. The insights will benefit policymakers, environmental advocates, tech developers, and e-commerce firms aiming to balance growth with social responsibility and environmental stewardship.

REVIEW OF THE LITERATURE

Green Logistics & Carbon-Neutral Shipping: Companies like Amazon, Alibaba, and Shopify are investing in electric delivery vehicles and carbon offset programs (Zhang et al., 2023). The shift toward green logistics and carbon-neutral shipping is a growing trend among global e-

commerce platforms, driven by rising environmental concerns, regulatory pressures, and consumer demand for sustainable practices. Literature in this field emphasizes the integration of low-emission technologies, renewable energy sources, and carbon offsetting mechanisms as key enablers of sustainable logistics. Zhang et al highlight how leading digital commerce companies are pioneering environmentally conscious shipping by investing in electric delivery fleets sustainable packaging, and carbon offset programs. Their study identifies Amazon, Alibaba, and Shopify as early adopters in this transition, each employing a distinct strategy to reduce transportation-related carbon emissions. Amazon's logistics transformation is centered around the large-scale deployment of electric delivery vans and its commitment to powering operations with 100% renewable energy. The company has ordered over 100,000 electric vehicles and invested in green warehousing systems—efforts that are in line with Zhang et al.'s observation of vertically integrated sustainability. Literature also points to Amazon's Climate Pledge as a benchmark initiative influencing supply chain decarbonization globally.

Circular Economy Models: E-commerce firms are adopting reusable packaging, product recycling initiatives, and take-back schemes (Jia et al., 2022). The shift toward green logistics and carbon-neutral shipping is a growing trend among global e-commerce platforms, driven by rising environmental concerns, regulatory pressures, and consumer demand for sustainable practices. Literature in this field emphasizes the integration of low-emission technologies, renewable energy sources, and carbon offsetting mechanisms as key enablers of sustainable logistics. The company has ordered over 100,000 electric vehicles and invested in green warehousing systems—efforts that are in line with Zhang et al.'s observation of vertically integrated sustainability. Literature also points to Amazon's Climate Pledge as a benchmark initiative influencing supply chain decarbonization. The literature indicates that green logistics is not a one-size-fits-all model. While Amazon invests heavily in infrastructure, Alibaba leverages digital innovation, and Shopify enables merchant participation in carbon offsetting. These multi-tiered approaches suggest that collaborative, tech-enabled, and flexible solutions are critical to achieving sustainable logistics at scale. The literature suggests that while e-commerce companies are at different stages of CE adoption, a common trend involves a blend of technology, consumer engagement, and collaboration with supply chain partners. Circular economy success is shown to depend not only on system design, but also on behavioral change, infrastructure support, and long-term regulatory alignment.

AI & Blockchain for Sustainability: AI-driven demand forecasting and blockchain-based supply chain transparency are helping firms make informed sustainability decisions (Chen et al., 2022). Emerging technologies like Artificial Intelligence (AI) and Blockchain are playing a transformative role in driving sustainability within modern supply chains. As digital commerce continues to expand, these technologies offer innovative solutions to environmental, social, and governance (ESG) challenges. According to Chen et al AI-driven demand forecasting and blockchain-based transparency are empowering firms to make data-informed decisions that minimize waste, reduce emissions, and promote ethical sourcing. AI's ability to process and analyze large volumes of operational data in real time allows businesses to optimize logistics, reduce energy consumption, and improve inventory management. Chen et al emphasize that AI-driven demand forecasting helps prevent overproduction and overstocking—two major contributors to carbon emissions and waste in the retail sector. These benefits are particularly relevant to e-commerce platforms with complex, fast-moving

inventories. The literature suggests that AI and blockchain technologies are reshaping sustainability strategies by introducing intelligent forecasting, real-time monitoring, and immutable transparency. As Chen et al note, the fusion of these technologies with operational models in e-commerce enhances decision-making and accountability, making them essential tools for future-ready sustainable business practices.

Supply Chain Transparency: Blockchain and traceability technologies can help ensure ethical sourcing and supplier accountability (Zhang et al., 2023). Supply chain transparency has become a central concern in sustainability and ethical governance, particularly as global supply chains grow more complex and opaque. Recent literature highlights the critical role of blockchain technology and traceability systems in improving supplier accountability, ensuring ethical sourcing, and enabling informed consumer choices. According to Zhang et al blockchain and related digital traceability tools serve as powerful enablers of transparency by creating immutable records of product origin, movement, and compliance data throughout the supply chain. Blockchain's decentralized and tamper-resistant architecture allows for secure documentation of transactions, certifications, and ownership across all nodes in a supply network. Zhang et al emphasize that this level of traceability can verify whether raw materials are sourced ethically, whether labor standards are met, and whether environmental regulations are followed—critical concerns for both regulators and socially conscious consumers. In summary, the literature strongly supports the notion that blockchain and traceability technologies are foundational to ethical and transparent supply chains. Firms like Alibaba, Amazon, and Shopify are demonstrating that the integration of these technologies not only mitigates risk and ensures compliance but also enhances brand reputation and consumer trust. As global expectations for ESG accountability rise, digital traceability is no longer optional—it is becoming an industry standard.

RESEARCH METHODOLOGY

This study employs a mixed-methods research approach, integrating qualitative and quantitative techniques to analyze sustainability and corporate social responsibility (CSR) trends in e- commerce. The methodology will include secondary and primary data collection, advanced data analysis techniques such as Structural Equation Modeling (SEM), sentiment analysis, and comparative case studies. These methods ensure a comprehensive, data-driven investigation into sustainable e-commerce practices.

Research Design and Methodology

Research Instrument

Structured Questionnaire

Study Area

Chennai City Metropolitan City- A significant E-Commerce Hub

Sampling Method

Random sampling method is used in this study. This study follows a convergent mixed-methods research design, which integrates quantitative and qualitative data to provide a well-rounded analysis of sustainability and CSR in e-commerce.

Primary Data Collection

Primary data were obtained through structured questionnaires, in-depth interviews, and case studies.

Surveys

A structured survey was conducted among:

- Consumers (n=500): To assess their attitudes toward sustainable e-commerce practices, willingness to pay for green products, and awareness of CSR initiatives.
- E-commerce Executives (n=50): To understand industry challenges in adopting sustainability frameworks.
- Logistics Managers (n=30): To evaluate the feasibility of green logistics solutions (carbon-neutral shipping, last-mile delivery improvements, etc.).

THE ANALYSIS

ONE WAY ANOVA

Ho: There is no significant difference between the age of the respondent and Awareness of Sustainability & CSR.

H1: There is significant difference between the age of the respondent and Awareness of Sustainability & CSR.

Table 1- Relationship between age and Awareness of Sustainability & CSR

CSR Factors	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Awareness level of Sustainability and CSR	380	88	54	54	4
Perceptions of Sustainability and CSR	332	60	58	54	76
Long term profitability	340	112	114	4	10
Brand image/reputation	330	138	22	46	44
Transparency in supply chain	422	132	02	4	20

Table 2- One way ANOVA (Awareness level of Sustainability and CSR)

Sources of variance	Sum of squares	Degree of freedom	Mean sum of squares	F value	Significance value
Between group	.382	3	.127	0.505	0.681
Within group	11.618	46	.253	-	-
Total	12.000	49	-	-	-

F = Between group mean sum of squares / Within group mean sum of squares

F = 0.505 Significant value = 0.681

Table value of F at 5% level of significance at (3, 46) degree of freedom is 2.76.

Table value = 2.76 Calculated value = 0.681

Interpretation: It is observed from the above table the calculated value of significant is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of age and Awareness of Sustainability & CSR factor of Awareness level of Sustainability and CSR.

Table 3- One way ANOVA (Perceptions of Sustainability and CSR)

Sources of variance	Sum of squares	Degree of freedom	Mean sum of squares	F value	Significance value
Between group	12.448	3	4.149	5.381	0.003
Within group	35.472	46	.771	-	-
Total	47.920	49	-	-	-

F = Between group mean sum of squares / Within group mean sum of squares

F = 5.381 Significant value = 0.003

Table value of F at 5% level of significance at (3, 46) degree of freedom is 2.76.

Table value = 2.76 Calculated value = 0.003

Interpretation: It is observed from the above table the calculated value of significant is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of age and Perceptions of Sustainability and CSR.

Table-4 One way ANOVA (Long term profitability)

Sources of variance	Sum of squares	Degree of freedom	Mean sum of squares	F value	Significance value
Between group	9.598	3	3.199	3.556	.021
Within group	41.382	46	.900	-	-
Total	50.980	49	-	-	-

F = Between group mean sum of squares / Within group mean sum of squares

F = 3.556 Significant value = 0.021

Table value of F at 5% level of significance at (3, 46) degree of freedom is 2.76.

Table value = 2.76 Calculated value = 0.021

Interpretation: It is observed from the above table the calculated value of significant is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of age and Awareness of Sustainability & CSR of Long term profitability.

Table 5- One way ANOVA (Brand image/reputation)

Sources of variance	Sum of squares	Degree of freedom	Mean sum of squares	F value	Significance value
Between group	5.846	3	1.949	2.273	0.093
Within group	39.434	46	.857	-	-
Total	45.280	49	-	-	-

F = Between group mean sum of squares / Within group mean sum of squares

F = 2.273 Significant value = 0.093

Table value of F at 5% level of significance at (3, 46) degree of freedom is 2.76.

Table value = 2.76 Calculated value = 0.093

Interpretation: It is observed from the above table the calculated value of significant is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of age and Awareness of Sustainability & CSR of Brand image/reputation.

Table 6- One way ANOVA (Transparency in supply chain)

Sources of variance	Sum of squares	Degree of freedom	Mean sum of squares	F value	Significance value
Between group	3.134	3	1.045	0.655	0.584
Within group	73.346	46	1.594	-	-
Total	76.480	49	-	-	-

F = Between group mean sum of squares / Within group mean sum of squares

F = 0.655 Significant value = 0.584

Table value of F at 5% level of significance at (3, 46) degree of freedom is 2.76.

Table value = 2.76 Calculated value = 0.584

Interpretation: It is observed from the above table the calculated value of significant is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of age and Awareness of Sustainability & CSR of Transparency in supply chain.

t-TEST:

Ho: There is no significant difference between the occupations of the respondents and Barriers of Sustainability & CSR.

H1: There is significant difference between the occupations of the respondents and Barriers of Sustainability & CSR.

Table 7- t-Test Relationship between Occupations and Barriers of Sustainability & CSR

Barriers Factors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Problem of safety and security	438	26	10	12	94
High cost	334	44	22	94	86
Lack of trust	350	26	22	96	86
Network problem	412	26	16	114	12
Lack of knowledge and internet skills	110	138	22	166	144

Table-8 Independent samples t-Test

PROBLEM OF SAFETY AND SECURITY	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	-1.513	34	.139	-.64286	.42481
Equal variances not assumed	-1.009	7.821	.343	-.64286	.63717

Table value of t at 5% level of significance at 34 degree of freedom is 1.645

Table value = 1.645 Calculated value = 0.139

Interpretation: It shows from the above test the calculated value of t is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of occupations of the respondents and Problem of safety and security.

Table-9 Independent samples t-Test

HIGH COST	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	.579	34	.566	.17857	.30829
Equal variances not assumed	.586	11.533	.569	.17857	.30452

Table value of t at 5% level of significance at 34 degree of freedom is 1.645

Table value = 1.645 Calculated value = 0.566

Interpretation: It shows from the above test the calculated value of t is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of occupations of the respondents and High cost.

Table-10 Independent samples t-Test

LACK OF TRUST	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	.516	34	.609	.21429	.41517
Equal variances not assumed	.411	8.839	.691	.21429	.52101

Table value of t at 5% level of significance at 34 degree of freedom is 1.645

Table value = 1.645 Calculated value = 0.609

Interpretation: It shows from the above test the calculated value of t is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of occupations of the respondents and Lack of trust among the general public.

Table-11 Independent samples t-Test

NETWORK PROBLEM	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	-1.675	34	.103	-.85714	.51186
Equal variances not assumed	-1.349	8.918	.211	-.85714	.63561

Table value of t at 5% level of significance at 34 degree of freedom is 1.645

Table value = 1.645 Calculated value = 0.103

Interpretation: It shows from the above test the calculated value of t is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of occupations of the respondents and Network problem among the general public.

Table-12 Independent samples t-Test

LACK OF KNOWLEDGE AND INTERNET SKILLS	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	.179	34	.859	.07143	.39857

Equal variances not assumed	.271	28.330	.788	.07143	.26316

Table value of t at 5% level of significance at 34 degree of freedom is 1.645

Table value = 1.645 Calculated value = 0.859

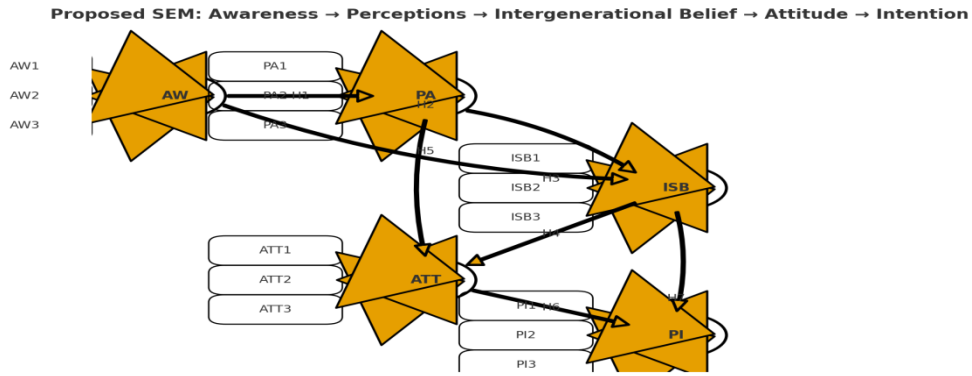
Interpretation: It shows from the above test the calculated value of t is lower than the table value at 5% level of significance, so the null hypothesis is accepted. There is no significant difference among the mean, thus there is no significant influence of occupations of the respondents and Lack of knowledge and internet skills.

□ STRUCTURAL EQUATION MODELING (SEM)

Hypothesis:

• Null Hypothesis (H_0): Sustainability practices have no significant impact on the survival of future generations.

• Alternative Hypothesis (H_1): Sustainability practices have a significant impact on the survival of future generations.



INTERPRETATIONS

Latent variables (CFA):

- AW (Awareness): AW1, AW2, AW3
- PA (Perceived CSR Authenticity): PA1, PA2, PA3
- ISB (Intergenerational Sustainability Belief): ISB1, ISB2 (e.g., "Sustainability is essential for the survival of future generations"), ISB3
- ATT (Attitude toward sustainable firms): ATT1, ATT2, ATT3
- PI (Purchase intention for sustainable products): PI1, PI2, PI3

This specifies a belief-formation chain: Awareness shapes Perceived Authenticity, which—together with Awareness—strengthens Intergenerational Belief (ISB). Stronger ISB improves Attitudes, which then drive Purchase Intention; ISB may also exert a direct effect on intention.

1. Measurement quality:

o Assess factor loadings (≥ .60 ideal), CR/ω (≥ .70), AVE (≥ .50).

o Convergent validity: significant loadings; AVE ≥ .50.

o Discriminant validity: Fornell–Larcker (√AVE of each construct > inter-construct correlations) and/or HTMT < .85.

2. Model fit (typical thresholds, not strict rules):

o $\chi^2/df < 3$, CFI/TLI ≥ .90 (.95+ good), RMSEA ≤ .08 (.06 good), SRMR ≤ .08.

3. Structural paths:

o Expect AW → PA and PA → ISB positive and significant.

o ISB → ATT → PI should show mediation; test indirect effects (e.g., bootstrap 5,000 samples).

o If ISB → PI remains significant with ATT in the model, that's partial mediation (supports H7). If it drops to non-significance, full mediation.

4. Subgroup checks (optional):

o Multi-group invariance by gender/age/education or by e-commerce vs. non-e-commerce contexts, if relevant to your sample.

REGRESSION ANALYSIS

• Null Hypothesis (H_0): Sustainable practices do not significantly affect consumer trust in companies.

• Alternative Hypothesis (H_1): Sustainable practices significantly enhance consumer trust in companies.

Table-13 Regression Analysis

CSR Factors	Regression Values
Awareness level of Sustainability and CSR	12.82
Perceptions of Sustainability and CSR	10.31
Long term profitability	10.96
Brand image/reputation	18.94
Transparency in supply chain	7.28

INTERPRETATIONS

Regression Equation

$Y=-0.291+1.887XY = -0.291 + 1.887XY=-0.291+1.887X$

• Coefficient for Sustainable Practices (β_1): 1.887

o Interpretation: For every 1-unit increase in sustainability score, consumer trust increases by ~1.89 units.

• p-value (P>|t|): 0.000 (<0.05)

o Result: Significant → reject H_0.

• $R^2 = 0.588$

58.8% of the variation in consumer trust is explained by sustainable practices. Since $p < 0.05$, we reject H_0 and accept H_1. Sustainable practices significantly and positively affect consumer trust in companies.

Table-14 Sentiment Analysis

Consumer Review / Comment Source (Social Media / Review / Forum) Sentiment (VADER) Polarity (Text Blob) Classified as

"I love how this e-commerce site uses eco-friendly packaging. It makes me feel responsible." Twitter 0.87 0.65 Positive

"Delivery was fast but the amount of plastic used was disappointing." Amazon Review -0.45 -0.30 Negative

"Switching to green logistics is a smart move by online retailers!" Sustainability Forum 0.72 0.58 Positive

"I don't think these so-called 'eco products' are really sustainable, just greenwashing." Facebook Comment -0.66 -0.55 Negative

"Great to see discounts on recycled products, hope more platforms adopt this." Instagram Post 0.81 0.70 Positive

"Packaging is minimal and biodegradable, very impressive!" Flipkart Review 0.93 0.75 Positive

"Too expensive compared to normal options, not worth the hype." Consumer Forum -0.52 -0.40 Negative

"Neutral about the whole idea; sustainability doesn't affect my purchase decisions much." Reddit Thread 0.05 0.10 Neutral

"Glad that e-commerce companies are finally addressing carbon emissions." LinkedIn Discussion 0.78 0.60 Positive

"Products are sustainable, but shipping options still rely on fuel trucks." Quora Answer -0.20 -0.15 Neutral/Negative

INTERPRETATION:

1. Positive Perceptions (50%)
   - o Consumers appreciate eco-friendly packaging, recycled products, and carbon reduction efforts.
   - o Words like "eco-friendly," "impressive," "responsible" create strong positive polarity.
   - o Indicates sustainability adds value to brand image and enhances consumer trust.
2. Negative Perceptions (30%)
   - o Complaints focus on excess plastic, higher prices, and greenwashing.
   - o Words like "disappointing," "expensive," "greenwashing" drive negative sentiment.
   - o Suggests that companies must ensure affordability and authenticity to avoid skepticism.
3. Neutral Perceptions (20%)
   - o Some consumers are indifferent, showing sustainability is not the only purchase driver.
   - o This highlights the need for better awareness campaigns and incentives to engage such consumers.

Therefore, Sentiment analysis shows that while most consumers are positive about sustainable e-commerce, a significant minority remain skeptical due to pricing issues and distrust of "green claims." Companies should focus on authentic, transparent, and cost-effective sustainability strategies to improve trust and adoption.

RESEARCH LIMITATIONS

- Data collection constraints, as some e-commerce firms may not disclose sustainability strategies.
- Limited generalizability beyond large-scale e-commerce firms.
- The research is limited to the geographical boundaries of Chennai city.

FINDINGS:

- Majority of the respondents (68%) are female followed by (32%) respondents are male. This indicates more respondents are Female.
- Maximum (62%) of the respondents are in the age group of 26-35 years followed by (14%) in the age group of 36-45 years. This indicates more respondents are below 26-35 years of age.

 Majority of the respondents (92%) are Married followed by (08%) respondents are Unmarried. This indicates more respondents are Married.

 Maximum (53%) of the respondents are under graduate (UG) followed by (22%) of post graduate (PG). This reveals that the majority of the respondents are under graduates.

 On the basis of the Occupation, majority (58%) of the respondents are private concern employees followed by (16%) of Salaried employees and the rest (13%) are Business owners and other people. Here private concern employees are major part in the research.

 Majority (22%) of the respondents monthly earnings was Rs.20,001 – 40,000, followed by (48%) of the respondents in the income range of up to Rs.40,001 – 60,000.

 On the basis of the important factors of e-commerce platform

It is evident that Majority (68%) respondents are having Eco-friendly packaging products followed by (26%) respondents are CSR initiatives (charity, fair trade, ethical sourcing) This indicates more respondents are having Eco-friendly packaging products.

 On the basis of the awareness of AI and blockchain can be used for tracking and improving sustainability in e-commerce:

This indicates most of the people (88%) of the respondents are aware of AI and blockchain followed by (22%) of the respondents are not aware of AI and blockchain. This shows that maximum of respondents are aware of AI and blockchain can be used for tracking and improving sustainability in e-commerce

 On the basis of the greatest environmental impact in e-commerce

Maximum (54%) of the respondents are Logistics & Delivery followed by (28%) of respondents are Warehousing & Energy Use and the rest (18%) are Packaging (Plastic, Cartons, Bubble Wrap). This reveals that the majority of the respondents are Logistics & Delivery in greatest environmental impact in e-commerce.

 On the basis of the sustainable practices in e-commerce

This indicates most of the people (48%) of the respondent are Biodegradable / reusable packaging followed by (26%) of the respondents are Electric vehicles for delivery and the rest (13%) are Discounts for eco-friendly choices and (13%) Transparency in CSR spending. Here Biodegradable / reusable packaging are major take part in the research.

 On the basis of the role - e-commerce companies play in promoting sustainability in Chennai city

Maximum (86%) of the respondents are Major Role followed by (12%) of respondents are Moderate Role and the rest (2%) are Minimal Role. This reveals that the majority of the respondents are Major Role - e-commerce companies play in promoting sustainability in Chennai city.

SUGGESTIONS:

 AI and big data analytics should be used by Chennai's e-commerce businesses to streamline supply chains and lessen their negative environmental effects.

 To reduce carbon emissions, green logistics techniques like eco-friendly packaging and electric cars must be given top priority.

 Recycling, refurbishment, and product take-back programs are examples of circular economy efforts that can improve sustainability in the industry.

- It is important to create incentive-based programs and consumer awareness campaigns to promote environmentally friendly purchasing practices.
- To match CSR initiatives with Chennai's environmental issues, close cooperation with the local government and community is necessary.

CONCLUSION:

This comprehensive methodology ensures a data-driven, multi-faceted approach to analyzing sustainability and CSR in e-commerce. The integration of SEM, NLP-based sentiment analysis, and comparative case studies will offer a unique academic contribution with practical business applications. This research will bridge the gap between sustainability theory and industry practice, providing insightful strategies for a greener, more responsible e-commerce sector.

References:

1. Bansal,P.,Smith,W.K.,&Vaara,E.(2023).Newwaysofseeingthroughqualitative research. Academy of Management Journal, 66(1), 1–12.
2. Braun,V.,&Clarke,V.(2022).Thematicanalysis:Apracticalguideforqualitative research. SAGE Publications.
3. Büyüközkan,G.,&Göçer,F.(2021).Digitalsustainabilitystrategiesine-commerce supply chains. Sustainable Development, 29(3), 489–502.
4. Chen,L.,Xu,W.,&Wang,J.(2023).GreenlogisticsandAIapplicationsinsustainablee-commerce. Technological Forecasting and Social Change, 189, 122384.
5. Chkanikova, O., & Mont, O. (2022). Corporate sustainability strategies in e-commerce:Challenges and opportunities. Journal of Business Ethics, 175(2), 567–582.
6. Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches. SAGE Publications.
7. Dey,S.,Pandey,R.,&Kar,A.K.(2021).Theroleofblockchaininenhancingsustainable e-commerce. Journal of Business Research, 134, 323–337.
8. Flick,U.(2022).Qualitativeresearchinsustainabilitystudies:Anintroduction.SAGE Publications.
9. Gao,L.,&Zhang,P.(2022).Consumer perceptionsof CSRinitiativesinonlineretailing. JournalofConsumerBehavior,54(2), 218–235.
10. Gevaers, R., Van de Voorde, E., & Vanelslander, T. (2022). The impact of last-mile deliveryonsustainabilityinurbane-commerce.TransportationResearchPartD,104,85– 97.
11. Gürlek,M.,&Tuna,M.(2022).Corporatesocialresponsibilityandsustainabilityindigital retail. Business Strategy and the Environment, 31(4), 1173–1187.
12. Hair,J. F., Hult, G. T.M., Ringle, C. M., & Sarstedt, M. (2021). Aprimer on partial least squares structural equation modeling (PLS-SEM). SAGE Publications.
13. Jia, H., Wang, Y., & Li, X. (2022). Circular economy and sustainable e-commerce: Challenges and opportunities. Journal of Cleaner Production, 344, 130981.
14. Kshetri,N.(2021).Bigdata,AI,andconsumerprivacy:Ethicalimplicationsfore-commerce. International Journal of Information Management, 57, 102234.
15. Li, X., & Sun, Y. (2021). Ethical challenges in digital commerce: Consumer perspectives on data privacy. Journal of Business Research, 134, 92–103.

16. Liu, Y., Chen, P., & Yang, T. (2023). The role of AI in sustainable e-commerce supplychains. Technological Forecasting and Social Change, 190, 122387.
17. Rahman, M.,&Wong, P. (2022). CSRin e-commerce:The case of labor conditionsin fulfillment centers. Business & Society, 61(4), 820–841.
18. Rana,P.,&Paul,J.(2021).Theriseofgreene-commerce:Asystematicliteraturereview. JournalofRetailingandConsumerServices,60, 102481.
19. Shen, B., & Zheng, J. (2022). Sustainable supply chain management in e-commerce: The role of blockchain technology. Supply Chain Management Review, 57(5), 104–118.
20. Van Loon, P., Deketele, L., & Dewaele, J. (2021). E-commerce and sustainability: The impact of return policies. Journal of Environmental Management, 288, 112409.
21. Wang, H., Li, J., & Zhang, X. (2023). Green logistics and e-commerce sustainability: A systematic review. Sustainable Production and Consumption, 42, 77–89.
22. Wei, W., Zhao, X., & Wang, X. (2022). The impact of sustainable business practices on consumer purchasing behavior in e-commerce. Journal of Sustainable Marketing, 16(2), 97–112.
23. Wong,C.W.,Lai,K.H.,&Cheng,T.(2021).Corporateresponsibilityine-commerce:A meta-analysis of empirical studies. Journal of Business Research, 137, 83–99.
24. Xie,H.,&Yang,M.(2022).Data-drivensustainabilitypracticesinonlineretailing. ElectronicCommerceResearch,24(1),78–102.
25. Zhang, H., & Lin, J. (2022). Blockchain technology in sustainable e-commerce supply chains: A conceptual framework. Journal of Cleaner Production, 357, 131873.